Category: Waveforms & Filters   **CIRCUIT IDEAS FOR DESIGNERS**   Schematic no. wf_47003.0

Function Generator

Description

This circuit utilizes a quad operational amplifier to produce 4 outputs at the 4 stages, consisting of a square wave output, a triangle wave output, a sine wave output and −2X gain amplifier respectively. The first stage functions as a square wave generator. Initially, assume that its output is at V+ (+2.5V). The +input voltage is determined by the ratio of the resistor divider, which, in this case, are the 27K and the 100K resistors. The output signal feeds back to +ve input terminal via the resistor network, with the operational amplifier acting as a comparator. A RC network charges the capacitor at −ve input terminal until the voltage crosses that at the +input voltage. At that point the output of the amplifier changes state to V- (−2.5V) as a result of amplifying now a negative input signal. The voltage on the +ve input terminal changes to a negative of the resistor divider ratio voltage. The RC network begins to discharge toward V-. When the voltage at −ve input terminal crosses below +ve input voltage, the output flips again to V+. Therefore the circuit functions as an oscillator, generating a square wave. When this square wave is integrated at the second stage, a triangle wave is generated at the output. Another integration of this triangle wave through the third stage produces a sine wave signal at the output of the third stage. The fourth and last stage is merely a standard inverting amplifier with a gain equal to −2.

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